

## CLAIMS

What is claimed is:

- 1 1. A method for automatically generating a network replication topology for use by a  
2 directory service in replicating the directory, comprising steps of:  
3 reading a plurality of router configuration files; and  
4 generating the network replication topology representing one or more sites and one or  
5 more site links based on information in the plurality of router configuration  
6 files.
- 1 2. The method of claim 1, wherein the information in the plurality of router  
2 configuration files includes router interface information and the step of generating the  
3 network topology is performed based on the router interface information.
- 1 3. The method of claim 2, wherein the step of generating the network topology  
2 comprises determining at least one site by identifying a sub-network on a Local Area  
3 Network (LAN) interface.
- 1 4. The method of claim 2, wherein the step of generating the network topology  
2 comprises determining at least one site link by identifying a Wide Area Network (WAN)  
3 interface.
- 1 5. The method of claim 1, wherein the step of generating the network topology  
2 comprises determining at least one site by identifying a router interface with a bandwidth  
3 exceeding a predefined threshold value.
- 1 6. The method of claim 1, wherein the step of generating the network topology  
2 comprises determining at least one site link by identifying a router interface with a bandwidth  
3 not exceeding a predefined threshold value.

1 7. The method of claim 1, wherein the step of generating the network topology  
2 comprises determining at least one site link by identifying a router interface with a packet  
3 round-trip-time exceeding a predefined threshold value.

1 8. The method of claim 1, further comprising a step of:  
2 reading preprocessing information, the preprocessing information including override  
3 information for nullifying the information associated with a same one or more  
4 sites or site links from the plurality of router configuration files, wherein the  
5 network topology is generated based additionally on the override information.

1 9. The method of claim 1, wherein the step of reading a plurality of router configuration  
2 files includes reading from a network management system.

1 10. The method of claim 1, wherein the step of reading a plurality of router configuration  
2 files includes reading from a router query result.

1 11. A method for automatically populating a directory service with a replication topology,  
2 comprising steps of:

3 reading router interface information from a plurality of router configuration files;

4 generating the replication topology representing one or more network sites and one or  
5 more network site links based on the router interface information;

6 storing the replication topology in a database; and

7 copying the replication topology from the database to the directory service.

1 12. The method of claim 11 wherein the step of generating the replication topology  
2 comprises steps of:

3 generating at least one site reference by identifying a sub-network on a Local Area  
4 Network (LAN) interface; and  
5 generating at least one site link reference by identifying a Wide Area Network  
6 (WAN) interface.

1 13. A method for automatically generating network site and site link information from a  
2 router configuration file for use in a directory service, comprising steps of:

3 reading preprocessing information, the preprocessing information including override  
4 information for nullifying information associated with one or more sites or  
5 one or more site links from one or more router configuration files; and  
6 reading router interface information from a router configuration file associated with  
7 each of one or more routers, wherein one or more site references is generated  
8 by identifying a sub-network on a Local Area Network (LAN) interface and  
9 one or more site link references is generated by identifying a Wide Area  
10 Network (WAN) interface and wherein the override information is applied to  
11 the site and site link references.

1 14. The method of claim 13, wherein the step of reading router interface information  
2 from a router configuration file comprises steps of:

3 reading a list of one or more router names from a source, wherein the source is  
4 a network management system, a database, or a router query result;  
5 generating a router name from the router configuration file associated with  
6 each of the one or more routers;  
7 comparing the one or more router names from the router configuration files to  
8 the list of one or more router names from the source, and

9 upon a router name from the router configuration files not being in the list of  
10 one or more router names from the source, generating an exception.

1 15. The method of claim 14 wherein the step reading router interface information from a  
2 router configuration file further comprises steps of:

3 generating a temporary site name for each router name from the router  
4 configuration file associated with each of the one or more routers; and  
5 associating each of the one or more site references determined from the router  
6 configuration file associated with each of the one or more routers with  
7 the temporary site name for the associated router.

1 16. The method of claim 15 wherein the step reading router interface information from a  
2 router configuration file further comprises steps of:

3 generating a partial site link for each of the one or more site link references  
4 determined from the router configuration file associated with each of  
5 the one or more routers; and  
6 associating each partial site link with the temporary site name for the  
7 associated router.

1 17. The method of claim 16 wherein the step reading router interface information from a  
2 router configuration file further comprises steps of:

3 generating a sub-network reference based on each of one or more "ip route"  
4 commands in the router configuration file associated with each of the  
5 one or more routers; and  
6 associating each sub-network reference with the temporary site name for the  
7 associated router.

1 18. The method of claim 13, wherein the step of reading preprocessing information  
2 comprises steps of:

3 reading a list of one or more site names from a data storage associated with a  
4 network management system;

5 reading from the data storage a list of one or more preprocessing site links and  
6 associated site link costs;

7 comparing one or more site names parsed from the one or more preprocessing  
8 site links to the list of one or more site names from the data storage  
9 and discarding one or more preprocessing site links upon a failure to  
10 match;

11 reading from the data storage a list of one or more preprocessing address  
12 blocks and at least one from a set consisting of a preprocessing site  
13 name associated with the one or more preprocessing address blocks or  
14 a command to ignore the one or more preprocessing address blocks;

15 comparing the preprocessing site name associated with the one or more  
16 preprocessing address blocks to the list of one or more site names  
17 from the data storage and discarding one or more preprocessing  
18 address blocks upon a failure to match;

19 reading a list of one or more domain controllers from the data storage and  
20 associating the one or more domain controllers to an Internet Protocol  
21 address and to a site name obtained from a network management  
22 system;

23 determining a domain associated with the one or more domain controllers,

24 comparing the Internet Protocol address for each of the listed domain  
25 controllers to the list of one or more preprocessing address blocks;  
26 whereupon the step of reading preprocessing information aborts if the Internet  
27 Protocol address is within one or more preprocessing address blocks  
28 and the preprocessing site name associated with the one or more  
29 preprocessing address blocks is not the same as the site name obtained  
30 from the network management system that is associated with the one  
31 or more domain controllers; and  
32 whereupon the step of reading preprocessing information continues excluding  
33 the one or more domain controllers from further processing if the  
34 Internet Protocol address is within one or more preprocessing address  
35 blocks associated with the command to ignore the one or more  
36 preprocessing address blocks.

1 19. The method of claim 18, further comprising steps of:

2 comparing an address of each of the one or more site references, one or more site link  
3 references, and one or more sub-network references to the one or more  
4 preprocessing address blocks;  
5 deleting from processing the one or more site references, the one or more site link  
6 references, and the one or more sub-network references having an address  
7 being a subset or superset of the one or more preprocessing address blocks  
8 and deleting from processing the partial site link associated with discontinued  
9 one or more site link references; and

if the temporary site name contains no site references, deleting from processing the temporary site name and associated one or more router names, partial site links, site link references, and sub-network references.

20. The method of claim 18, further comprising steps of:

merging one or more temporary site names and associated partial site links, site links, sub-network references, and router names into one or more newly created complete site names; and  
deleting from processing the one or more temporary site names merged into the one or more newly created complete site names, thereby reducing the quantity of temporary site names and increasing the quantity of site references associated with one or more temporary site names.

21. The method of claim 18, further comprising steps of:

processing the one or more sub-network references to ensure that sub-network references are not duplicated;  
processing the one or more sub-network references to ensure that the network site information is minimized; and  
merging the one or more sub-network references associated with one or more temporary site names into the one or more site references associated with the same one or more temporary site names.

22. The method of claim 18, further comprising a step of:

generating a site link between one or more temporary site names, comprising the steps of

4 processing each partial site link associated with each of the one or more  
5 temporary site names to generate a valid site link based on matching a  
6 first partial site link associated with a first temporary site name with  
7 only a second partial site link associated with a second temporary site  
8 name,  
9 reading a list of one or more site links to determine if an existing site link  
10 between the first temporary site name and the second temporary site  
11 name exists,  
12 upon existence of an existing site link, comparing a bandwidth of the existing  
13 site link to a bandwidth of the valid site link,  
14 upon the bandwidths being equal, summing the bandwidths to create a  
15 summed bandwidth and associating the summed bandwidth  
16 with the existing site link and discarding the valid site link,  
17 upon the bandwidths being unequal, maintaining the existing or valid  
18 full site link with a larger bandwidth and discarding the other  
19 of the existing or valid full site link,  
20 upon non-existence of the existing full site link, generating a valid site link  
21 between the first temporary site name and the second temporary site  
22 name, the valid site link including a first partial site link associated  
23 with the first temporary site name and a second partial site link  
24 associated with the second temporary site name,  
25 comparing the bandwidth of the first partial site link to the bandwidth  
26 of the second partial site link, and

27                   upon the bandwidths being equal, generating a first site link cost based  
28                   on the equal bandwidth and associating the first site link cost  
29                   with the valid site link,  
30                   upon the bandwidths being unequal, generating a second site link cost  
31                   based on the smaller bandwidth and associating the second site  
32                   link cost with the valid site link.

1    23.    The method of claim 18, further comprising steps of:  
2           replacing one or more temporary site names with one or more domain controller site  
3           names generated from an association of at least one listed domain controller  
4           from the data storage and an Internet Protocol address of the domain  
5           controller; and  
6           comparing the one or more preprocessing site names to the one or more domain  
7           controller site names;  
8           upon a comparison match, merging the one or more preprocessing address blocks  
9           associated with the one or more preprocessing site names with the one or  
10          more domain controller site names and deleting from processing the one or  
11          more preprocessing site names;  
12          generating a single list of site names including the one or more temporary site names  
13          and the one or more domain controller site names; and  
14          ensuring that each site name is associated with another connected site name.

1    24.    A computer-readable medium carrying one or more sequences of instructions for  
2           automatically generating a network topology for a directory service, wherein  
3           execution of the one or more sequences of instructions by one or more processors  
4           causes the one or more processors to perform steps of:

5 reading router interface information from a plurality of router configuration files;  
6 generating the network topology representing one or more network sites and one or  
7 more network site links based on the router interface information.

1 25. The computer-readable medium of claim 24 wherein execution of the one or more  
2 sequences of instructions by one or more processors causes the one or more  
3 processors to perform the step of generating the network topology by causing the one  
4 or more processors to perform a step of:

5 generating at least one site reference by identifying a sub-network on a Local Area  
6 Network (LAN) interface.

1 26. The computer-readable medium of claim 24 wherein execution of the one or more  
2 sequences of instructions by one or more processors causes the one or more  
3 processors to perform the step of generating the network topology by causing the one  
4 or more processors to perform steps of:

5 generating at least one site link reference by identifying a Wide Area Network  
6 (WAN) interface.

1 27. A computer system comprising:

2 a network interface; and

3 one or more processors connected to the network interface, the one or more  
4 processors configured for

5 reading router interface information from a plurality of router configuration files;

6 generating a network topology representing one or more network sites and one or  
7 more network site links based on the router interface information.

1 28. The computer system of claim 27 wherein the network topology is generated for use  
2 with a directory service and the one or more processors are further configured for  
3 generating the network topology by generating one or more network site references  
4 by identifying a sub-network on a Local Area Network (LAN) interface.

1 29. The computer system of claim 27 wherein the network topology is generated for use  
2 with a directory service and the one or more processors are further configured for  
3 generating the network topology by generating one or more site link references by  
4 identifying a Wide Area Network (WAN) interface.

1 30. An apparatus for automatically generating a network topology for a directory service,  
2 the apparatus comprising:  
3 means for reading a plurality of router configuration files; and  
4 means for generating the network topology representing one or more sites and one or  
5 more site links based on information in the plurality of router configuration  
6 files.

1 31. The apparatus of claim 30, further comprising:  
2 means for determining at least one site by identifying a sub-network on a Local Area  
3 Network (LAN) interface.

1 32. The apparatus of claim 30, further comprising:  
2 means for determining at least one site link by identifying a Wide Area Network  
3 (WAN) interface.